Clinical Update

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Extraction site preservation

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Introduction

Teeth that have hopeless prognoses as a result of periodontal disease, fractured roots, etc. should be extracted as soon as a definitive diagnosis and treatment plan has been established. The prolonged retention of hopeless teeth will result in unnecessary loss of supporting bone and eventual creation of a deformity in the alveolar ridge. These deformities can present as esthetic and functional obstacles for future restorative treatment. As a result of appropriate treatment planning however, many of these problems can be prevented or minimized at the time of extraction.

Ridge preservation techniques can be employed to preserve and augment the original dimensions of the edentulous ridge reducing the risk of a post-operative alveolar insufficiency. These techniques use the principals of Guided Tissue Regeneration (GTR) to accomplish this goal.

Background

The resorption patterns of maxillary and mandibular arches have been studied by Cryer, Rogers and Applebaum, and Pietrokovski (1,2,3).

In the mandible, the tooth socket is formed by two thin bony plates that tend to resorb at equal rates toward the socket. In the maxilla, a thin alveolar buccal plate and a thick bony plate of the palatal vault form the socket. The thinner buccal plate resorbs at a faster rate towards the palatal plate following extraction. This resorptive pattern can result in a buccolingual deficiency or deformity.

There are several common causes of alveolar ridge defects. These include: developmental defects, periodontal disease, vertical root fracture, abscess formation, surgical trauma and traumatic injury. In each of these instances the magnitude of the resulting defect depends to a large extend on the width and height of the remaining bony walls. A treatment plan that addresses the preservation of these walls will facilitate the design of fixed or removable prosthetic therapy as well as implant placement.

Selection of materials (bone grafts and barriers)

The treatment of choice for an extensive alveolar defect is a combined approach using bone graft material and a physical barrier (4,5,6).

Grafting materials: There is a wide variety of grafting materials available on the market. The ideal product would be one that is both Osteoinductive (induces actual bone forming cells) and Osteoconductive (serves as a scaffold for bone growth). Grafting materials commonly used today are the particulate grafts namely Demineralized Freeze Dried Bone Allograph (DFDBA), Mineralized Freeze Dried Bone Allograph (FDBA) and Deproteinized Natural Cancellous Bone Mineral (Bio-Oss™). Autogenous bone grafts from the patient's chin and ramus are generally not utilized for extraction socket preservation.

Each of the products listed, are considered "resorbable" grafting material that are generally replaced by vital, mature bone through time.

Barrier materials: Barrier membranes are primarily employed to exclude the epithelium and gingival connective tissue from invading the defect and to maintain space so that bone-forming cells can fill the defect.

Bioabsorbable (Collagen) and non-absorbable (Gore-Tex™ expanded Polytetrafluoroethylene or e-PTFE) membranes have been studied with regards to the augmentation of extraction sockets (7,8). Collagen membranes are generally resorbed between 4-8 weeks. The e-PTFE membranes must be removed surgically after an appropriate healing period has been achieved.

Surgical technique

Ridge preservation begins with atraumatic extraction whenever possible. This is followed by careful examination of the site. Where indicated, combined therapy (bone graft and barrier) is used to preserve the ridge.

Atraumatic extraction: When the tooth is deemed hopeless and extraction is imminent, atraumatic extraction techniques are recommended. Periotomes, which are

narrow, flat instruments (Woodson, Hu-Friedy, Chicago IL) or a #15 scalpel blade are directed apically along the tooth sulcus to sever the periodontal ligaments. The tooth is elevated and removed with forceps using a gentle, rotational movement. Bucco-lingual forces are avoided to prevent damaging the integrity of the labial bone. If the tooth has multiple roots, curved roots, or other anatomical features that complicate removal, it may be necessary to section the tooth using a surgical handpiece.

Site evaluation: Once the hopeless tooth has been extracted atraumatically, the socket is evaluated. If all four walls of the extraction socket are intact, the socket will simply heal with the expected natural resorption pattern (9). In the event where a wall is missing (most commonly the buccal or facial wall), the combination of particulate bone graft material and a barrier will be used to regenerate the site. A full thickness flap is reflected beyond the mucogingival junction and the site is debrided carefully. Once the particulate graft and the barrier are placed in the extraction socket, the flap is coronally positioned and sutured.

In esthetic areas, the clinician can have a temporary treatment partial (TTP) made prior to the extraction that can be delivered on the day of the extraction. It is important to relieve the TTP on the tissue side so that there are no undo pressures on the augmented site. Generally these sites are reentered for implant placement in 4-6 months or can be restored with conventional fixed partial denture once the soft tissue has had a chance to mature.

Conclusion

As clinicians, we can prevent or minimize dentofacial deformities of the maxilla and the mandible following extractions. This goal can be achieved by early diagnosis and treatment, understanding the effects of the pathologic environment on supporting tooth structures and finally atraumatic extraction of hopeless teeth.

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